and accept his ruling. All will be cautious how they dissent from his expressed opinions. But it seems to us that to recommend the wholesale rejection of a large number of published measures of double stars is a drastic proposal, from which a less stern critic than the author might well recoil. It may be admitted that the possessors of small telescopes have always struggled to measure objects for which their instruments were unfitted. Indeed, a double-star observer never seems happy unless he is trying to measure something he can see very imperfectly. But simple dissatisfaction with the manner in which an observation has been made does not offer any adequate criterion for the rejection of doubtful observations, and we can hardly accept the assertion "that there need be no difficulty or hesitation in deciding as to the proper material to be used." This, as it stands, is a hard saying, and we may very well doubt if we have correctly understood the author.

He is on safer ground when he declines to deduce any inferences which might be based on the grouping of statistics. He is at present content to collect facts and to regard as premature any attempt to establish, or even suggest, theories on the limited information at command. The remark is made that very little has been done in the way of finding close pairs below the ninth magnitude, and that the effect of recent discovery in this direction may controvert the conclusions drawn from the older measures. This may doubtless be true, but the lack of sufficient data has seldom prevented the adoption of a working hypothesis. Certainly when Prof. Burnham sums up what has been accomplished in a century of double-star observing the results seem somewhat meagre for theory building, and emphasise the necessity for that careful and systematic measurement upon which he insists. There are only eighty-eight systems for which orbits have been found, and of this number only thirty-four can be regarded as of any value. As to the remaining fifty-four systems, the periods and "all the elements of the orbits are wholly uncertain and worthless. They cannot be regarded even as approximations . . . and in some instances it is not certain that they are physical systems at all." This severe criticism can be justified. Perhaps some of these indecisive results and the eagerness to build upon unsuitable observations may be traced to the influence of Herschel, and the apparent success that attended his ingenious device for deriving an approximate orbit. More rigorous methods have, however, given results of scarcely greater trustworthiness, and the tendency now is to leave double-star orbits severely alone.

It may be of greater practical utility to note that our knowledge of double stars has suffered from the want of organisation among observers. As the author puts it, "Since the observations of Struve the work of micrometrical measurement of double stars has not been wisely distributed. A vast amount of time has been practically wasted in the duplication of measures of the prominent and familiar pairs and in observing objects which need no attention except at long intervals." But Prof. Burnham may here be reminded that it is not enough to suggest that the working lists of double stars should be more carefully selected. What is wanted is authoritative leadership and sympathetic guidance. Such an influential position the writer of these books might worthily occupy. His competency no one would question. The necessity for cooperation among astronomers and the judicious husbanding of resources is becoming more and more recognised. The beneficial effect of organisation in coping with large masses of work is acknowledged. Isolated and unmethodical labour is accompanied by many evils, but none more noticeable than that of overlapping and needless duplication. These evils cannot be entirely avoided, but they can be reduced to a minimum.

Overlapping may to some extent be beneficial. An example is supplied by the very admirable work which Mr. Lewis has lately published through the Royal Astronomical Society. But it is not often that two experts work on so nearly parallel lines. Mr. Lewis has done in a very thorough and masterly manner for the Struve stars what Prof. Burnham has accomplished for a larger number. Mr. Lewis's work may be the more efficient, in the sense that it enables us to dispense with a larger number of original authorities, but there would have been no great difficulty and some advantage in combining the merits of both compilations. It is not necessary to give illustrations of the way in which observations are duplicated. It is difficult to quote instances in which independent lines of investigation are being pursued. The Lick Observatory has made the search for close double stars of feeble magnitude peculiarly its own. In this department is doubtless found an admirable employment for large optical power. Mr. Burnham has added many new doubles to our catalogue, but apparently finds a sufficient field for his energy in the re-measurement of recognised doubles. Throughout the United States a vast number of observers are interested in double stars, but in their work it is impossible to recognise any well-developed plan. On this side of the Atlantic, besides the excellent work that is being done at the Royal Observatory, which again demands large aperture, we have an army of amateurs, headed, we may say, by Mr. Maw, the late president of the Royal Astronomical Society, whose contributions to the general store would be increased in value if designed to form part of a definite scheme. Too often double-star measurement is the refuge of the leisured amateur, who finds in this kind of work an agreeable occupation. Such irresponsible observers stand particularly in need of direction, and if some scheme of cooperation could be formulated, Prof. Burnham's intimate acquaintance with the subject would be of immense assistance. He has admirably arranged the material that is to be observed; he has made us apprehend the extent of the field of labour and the abundance of the harvest; he has shown what can be done by unwearying industry and painstaking perseverance; let him complete his work by organising the labourers and infusing into their work system and continuity.

FOOD INSPECTION AND ADULTERATION.

SIR JAMES CRICHTON BROWNE, as president of the Association of Sanitary Inspectors, delivered last week the customary address at the annual meeting of the association. His remarks, devoted largely to the question of purity in foodstuffs, were a forcible presentation of matters which, well known to those concerned in the problem of food-control, deserve the serious attention of a wider circle, since as consumers and as citizens all are interested in the points brought forward.

The most important topic dealt with was that of a pure milk supply. It is "the primary and paramount food question." There is no need to enter here into details of adulteration, but it may be stated that according to the Local Government Board reports ten per cent. of our milk is either adulterated with water or impoverished by the abstraction of fat, or both; whilst a much larger proportion is so manipulated as to leave it only just within the official limits taken as criteria of genuineness. Moreover, the practice of sophistication appears to be extending.

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Unfortunately, however, milk is a product which, naturally, varies much in quality. As a consequence there are difficulties, well known to those who administer the Sale of Food and Drugs Acts, in the way of preventing the manipulation mentioned. To avoid punishing the innocent some latitude must be allowed to the guilty—and the guilty take full advantage of it. It does not follow that less latitude should be given. Careful consideration will show that as regards the official "standards" by which milk is judged, the balance is held as evenly as is practicable between the consumer on the one hand and the producer on the other.

At the moment, what seems to be the most pressing question of milk supply is the matter of cleanliness. Whether the milk is genuine or whether it is watered, at least the introduction of filth ought not to be tolerated. Dirty byres, dirty cows, dirty hands; an atmosphere of dust and micro-organisms; tuberculous udders and uncleanly churns; these may each and all have a part in contaminating the foodstuff which, as Sir James puts it, "enters into the diet of a vast majority of the population, and forms the almost exclusive food of its most susceptible units." There is here a very real need for improvement. Nor does it appear certain that any new legislation is necessary. The Public Health Act and the Dairy, Cowsheds, and Milkshops Order would perhaps suffice as regards the machinery; but there is often local reluctance to put the machinery in motion.

In the matter of butter, to which Sir James devoted a part of his address, the hands of the authorities will be materially strengthened by the new Butter and Margarine Act. It was quite time. The chief malpractices to which this article of food is subjected were described some months ago in the columns of this journal (Nature, vol. lxxiii., p. 466). One or two examples from the report of the principal chemist of the Government Laboratory may be cited to illustrate the recent history of the matter. During last year a creamery in this country was visited under the authority of a search-warrant, and the process of adulterating butter with lard was found in full swing on the premises. Other such places are known to use condensed milk for incorporation with butter. Again, an unscrupulous individual was found offering for sale a process for the "scientific" manipulation of butter by blending it with beef-fat or lard; and eventually he was indicted for inciting to commit a misdemeanour. He was sent for trial, but the Old Bailey never saw him; the authorities had to be content with estreating his bail for 800*l*.

As remedial measures Sir James Crichton Browne mentions provisions that were either previously existent or have been included in the Butter and Margarine Act of last session. The importer is held responsible for the genuineness of the butter he imports, and must find his remedy against the foreign producer. All butter factories must be registered, and be subject to inspection. Any oils or fats found that are capable of being used in the adulteration of butter are to be considered as intended to be so used unless the contrary is proved, and their presence constitutes an offence under the Act. Though not all that could be wished, the measure will be a valuable one in many respects, and should do much to check fraudulent manipulation of butter.

But a much more drastic and far-reaching enactment is just now coming into force in the United States, and the working of one of its provisions in particular will be watched with much interest in this country. Its effect is to ensure that articles of food and drugs shall be labelled so as to show the purchaser, within limits, exactly what the articles are. The description must not "be false or misleading in any particular," whether as to composition, quality, origin, or what not. Thus an article must be stated on the label to be "prepared with glucose," "coloured with sulphate of copper," "dyed with aniline dye," or to be "composed of fragments and scraps from a mushroom cannery," and so on, as the case may be. Moreover, in the case of certain drugs—morphia, cocaine, chloral, chloroform, and others—the proportions must always be stated on the label. If the preparation is found not to agree with the description it is deemed to be "misbranded," and offends against the Act. It is too early yet to say exactly what the effect of this compulsory candour will be, but obviously it affords a powerful means of enforcing commercial honesty. This, however, is not all that is being done. So long as a substance is left undefined, so long is it possible for a "trade custom" to be alleged in defence of malpractices. Witness, for instance, the discussions upon "what is whisky?" and "what is brandy?" which have recently arisen in this country. Hence the new American law is being supplemented by a series of schedules defining the various food products and fixing certain "standards" in respect of them. The appointment of a committee to draw up similar regulations for the United Kingdom has been urged, but at present little more has been done in the matter.

Another point of much importance touched upon by Sir J. Crichton Browne is the open or veiled antagonism of some local authorities to anything like reforming zeal on the part of their medical officers, analysts, and inspectors. The personal interests of influential councillors may clash with the public welfare, and an official may find his tenure but short if he becomes too zealous. How, it is asked, can a public official act impartially if the fearless performance of his duty brings him into the position of having to prosecute his employers?

"Vice," says Sir James, "is mind in the wrong place." Perhaps our present system of local government often puts men in the wrong place.

C. Simmonds.

SCIENTIFIC WORK IN INDIA.

The Asiatic Society of Bengal continues to make satisfactory progress, its membership having increased from 343 in 1904 to 407 in 1906. In his annual address for the latter year the president, Sir A. Frazer, Lieutenant Governor of the Province, expressed his disappointment that so few civilians and members of other services have joined the society. He suggested that the society did not make itself sufficiently known; that the increasing use of English in Bengal discourages the use of the vernacular tongues; but he chiefly attributes the lack of official interest in the work to what he calls "the prevalence of mere officialism." He therefore proposes to appoint a joint committee of savants and officials to investigate the question, and to endeavour to bring about more satisfactory relations between the society and the services.

W. Crooke

It is well that the attention of the authorities has been directed to this important subject. Such a committee is, however, hardly likely to throw much new light on the matter. The causes enumerated by the president have no doubt tended to increase the prevailing indifference felt by Indian officials to scientific inquiry and the study of the people, their languages, superstitions, and beliefs. But, in spite of the cheerful optimism of the Lieutenant Governor, the causes of this failure lie nearer home than he would be disposed to admit. All services naturally take their tone from their leaders, and, as a matter of fact, the Indian Government has always regarded

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